Edge Zero
Unit 7A 7TH Floor, New Solid Building
357 Sen. Gil Puyat Ave.
Makati, Philippines

INSTALLATION, COMMISSIONING AND OPERATION MANUAL

ENERGY MONITOR v3.0

EE-409-001 (ENERGY MONITOR V3.0 COMMS WI-FI + CAT-1)

I. DOCUMENT INFORMATION

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Prepared by	Joseph Cruz	Date of Issue	11/26/2025

II. APPROVED BY

Engineering Manager	Jian Carlo Zapata	Date:

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III. REVISION HISTORY

Revision no.	Date of Revision	Revision no.	Date of Revision
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IV. CHANGE RECORD

Revision no.	Prepared by	Description on Changes
1.0	N. Te/J. Cruz/L. Torio	Initial Release for Safety/UL Certification
1.1	N. Te/J. Cruz	Add breaker on installation pictures.
1.2	R. Bautista/J. Cuz	Change installation pictures to high resolution.
1.3	R. Bautista/J. Cuz	Change from Delta with Line C earthed to Delta clockwise Add Delta counterclockwise
1.4	R. Bautista/J. Cuz	Add note on CT return
A1	N. Te / J. Cruz	Official Release

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V. TABLE OF CONTENTS

VI. IMPORTANT INSTRUCTIONS AND WARNINGS

This manual contains important instructions. Failure to read and follow all instructions carefully before installation and operation will void the warranty of the Energy Monitor. This action could cause serious personal injury, fire hazards, and electric shock that may lead to death.

The Energy Monitor is designed, tested, and certified to meet all applicable Australian Safety Standards. Safety precautions must be observed and followed during installation and operation to (i) eliminate the risk of personal injury and (ii) ensure safe installation.

Installation, commissioning, service, and maintenance of the Energy Monitor must only be performed by fully qualified personnel who are licensed to local applicable certifications and regulations. Means for safe isolation must be incorporated in accordance with the wiring rules.

Figure 1. Important Instructions and Warnings

Before starting the installation or commissioning, kindly please read through this complete manual and note all the warnings.

After installation and commissioning, this manual must be made available for future operations and maintenance.

CAUTION:

1. The Energy Monitor comes with safety rated Current Transformers (CTs) with internal burden resistors to prevent any electrical arcing during the installation in case an Open CT was clamped on a conductor.

2. This safety rated CTs should not exceed 333mV.

3. CTs without internal burden resistors are not applicable and may damage the Energy Monitor.

Installation and wiring termination of the Energy Monitor shall be performed by a qualified personnel, in compliance with local electrical and safety standards.

Figure 2. Caution Regarding CT Installation

WARNING

Edge Zero manufactured component parts that can be used in a wide variety of industrial and commercial applications. The selection and application of Edge Zero Modules remains the responsibility of the equipment designer or end user. Edge Zero accepts no responsibility for how its Modules may be incorporated into final design. Under no circumstance should any Edge Zero Module be incorporated into any Module or design as the exclusive or sole safety control, all controls should be designed to dynamically fault defect and fail safe under all circumstances. Any warning provided by Edge Zero must be passed through to the end user. Edge Zero offers a warranty only as to the quality of its Module to conform to the catalogue specifications. No other warranty is offered. Edge Zero assumes no liability for any personal injury, property damage, losses or claims arising out of the misapplication and non-performance.

VII. PRODUCT DESCRIPTION

1. Introduction

The Energy Monitor is a real time energy monitor device in a UL 94-V0 approved Polycarbonate IP2X DIN enclosure which is installed into the switchboard of a residential or SME commercial operation. The product will transmit data to a cloud database which is then used to provide usage and energy insights to residents via a mobile app experience.

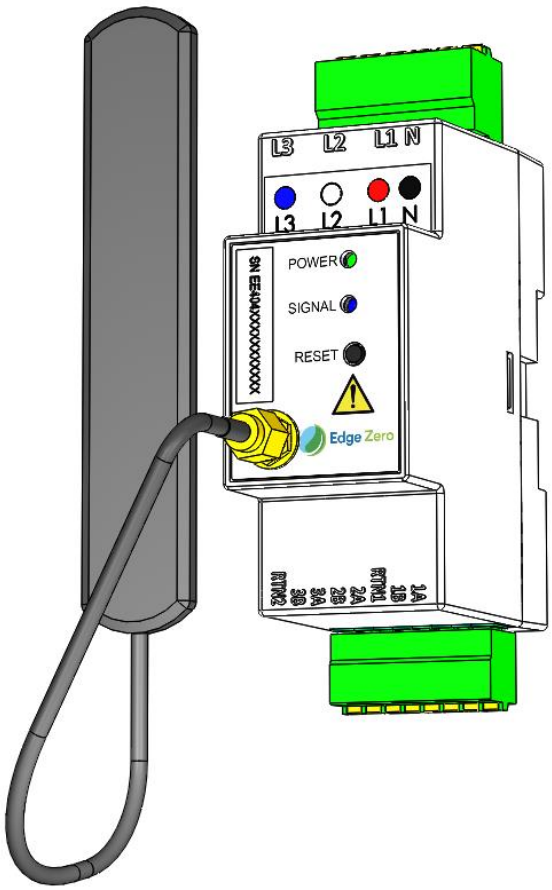


Figure 3. Energy Monitor Unit

2. Mechanical

2.1. Mechanical Outline
Two-pole, 35mm DIN package
External plastic housing to meet electrical safety standards (UL 94-V0).
2 LED indicator for Power (Green) and Communications (Wi-Fi Amber and 4G Blue)
1 Push button for Access Point activation
1 LTE Antenna

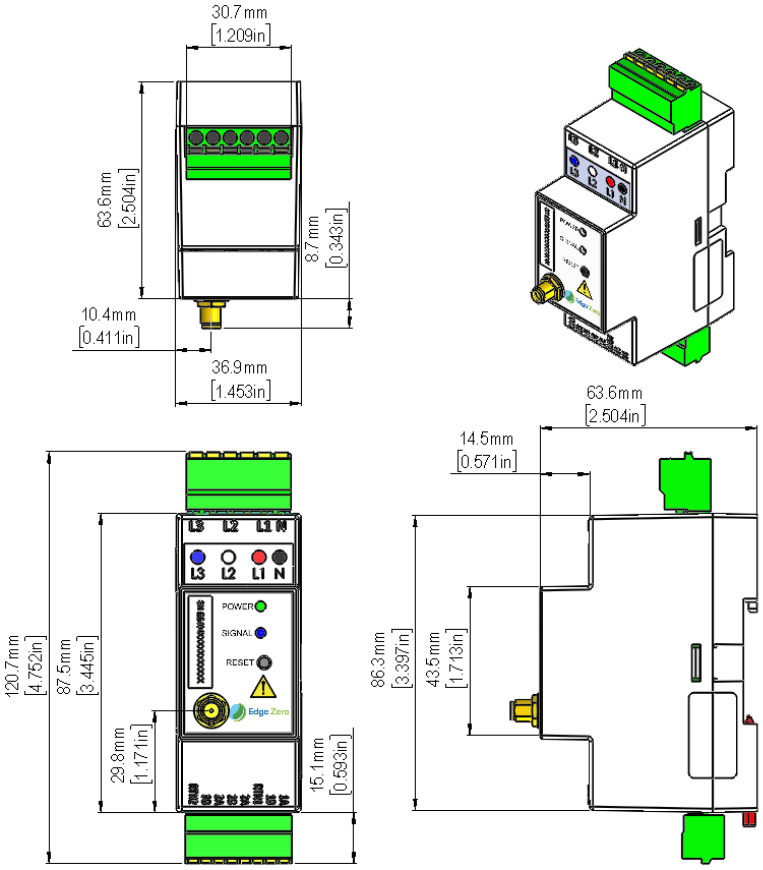


Figure 4. Mechanical Outline

2.2. Marking and labels

EDGEZERO PTY LTD	
Model	EE-409-XXX
Input	100-277Vac, 40mA max.
Frequency	50Hz / 60Hz
Operating Temp.	-10 to 60°C Ambient
CT Rating	333mV
Max. Humidity (Non-condensing)	95% RH
Unit Weight	100 grams
Serial No.	EE409XXXXXXXXXX
Measurement Category III	
Contains FCC IDs: XMR201906EG21G, N7NHL78, 2AC7Z-ESP32WROOM32E	
MADE IN XXXXXX	

Figure 5. Model Label and Safety Approval Marking

All marking and printing are permanent, clear, legible, and insoluble in standard solvents such as water, trichloroethylene, etc.

2.3. Box Content

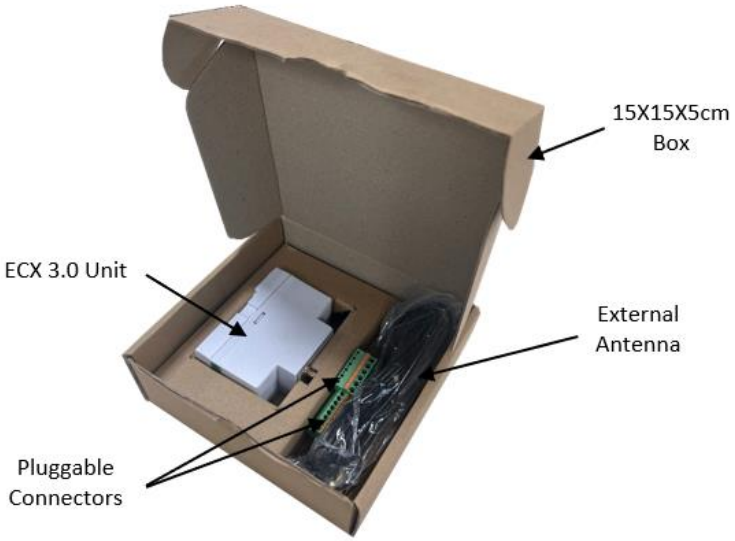


Figure 6. Box Content Complete Set

3. Environmental

Table 1. Environmental Requirements

Relative Humidity	**Not more than 75% non-condensing**
Air Pressure	**75kPa to 106kPa**
Altitude	1000m
Average Temperature	**30 °C**

3.1. Cooling and Mounting

Convection cooling; no forced-air cooling is required.

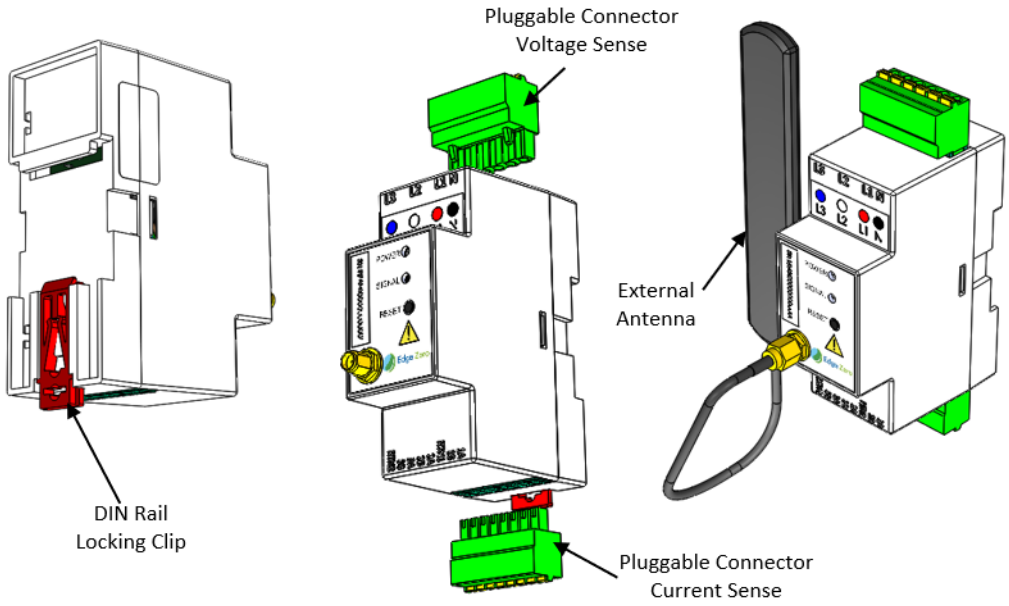


Figure 7. Mounting Orientation

4. Installing the Energy Monitor

4.1. Position the bottom slot of Energy Monitor into the bottom rail of the DIN rail at an angle approximately as shown.

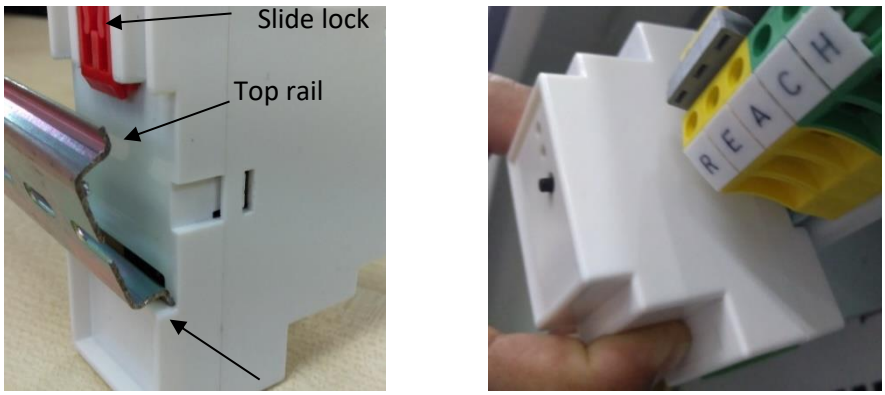


Figure 8. Din Rail Position Angle

4.2. Push the upper part of the Energy Monitor toward the DIN rail as shown until the slide lock slides upward & back and hear a clicking sound.

Figure 9. Din Rail Sliding Lock

4.3. Install the LTE Antenna of the Energy Monitor. Place the antenna in an upright position as shown and rotate the interconnect until the antenna is firmly fastened.

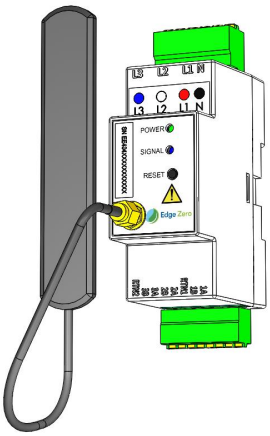
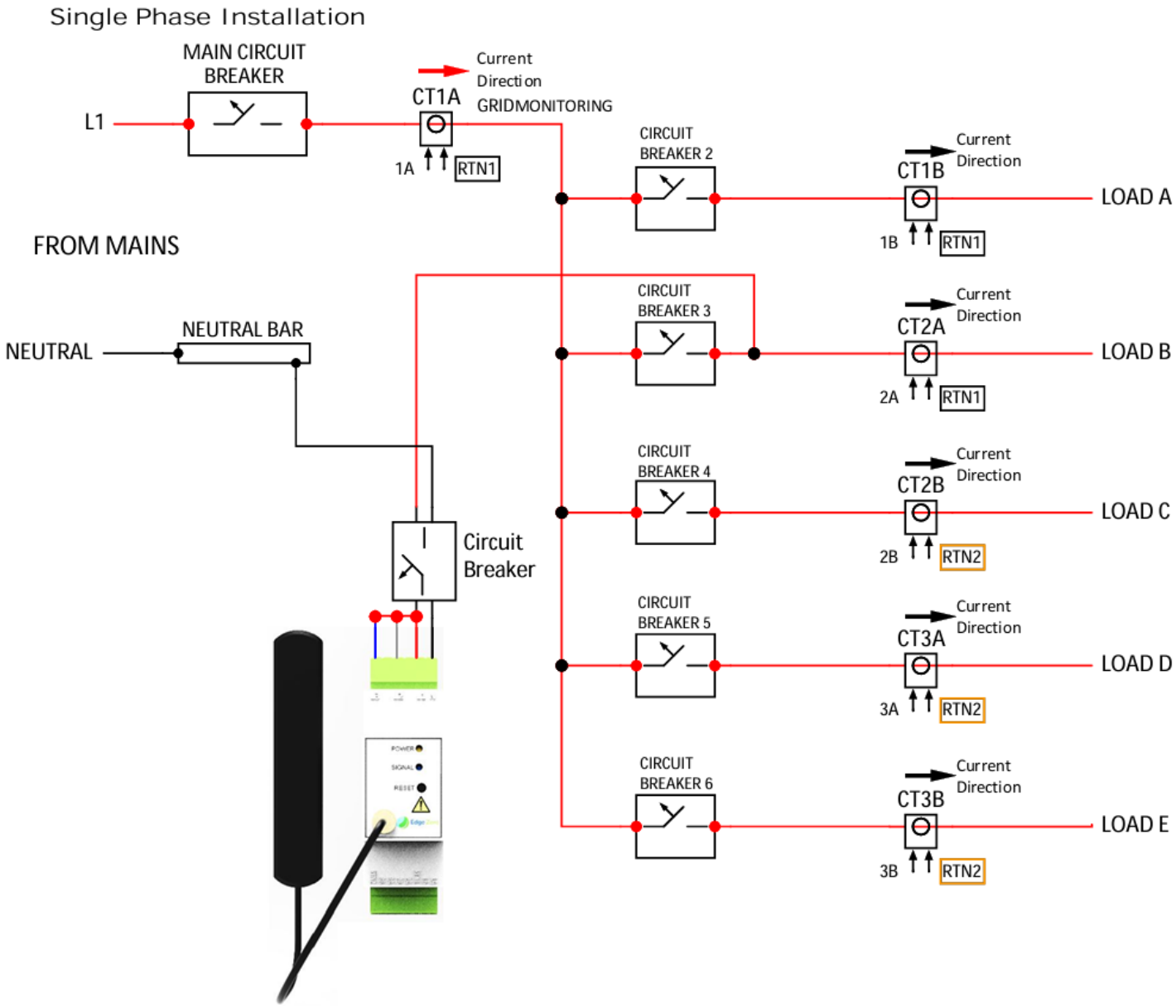


Figure 10. LTE Antenna Installation

5. Wiring Diagram

5.1. Residential or Small Commercial (Non-Solar Installation)

5.1.1. Single Phase Connection (NON-SOLAR)



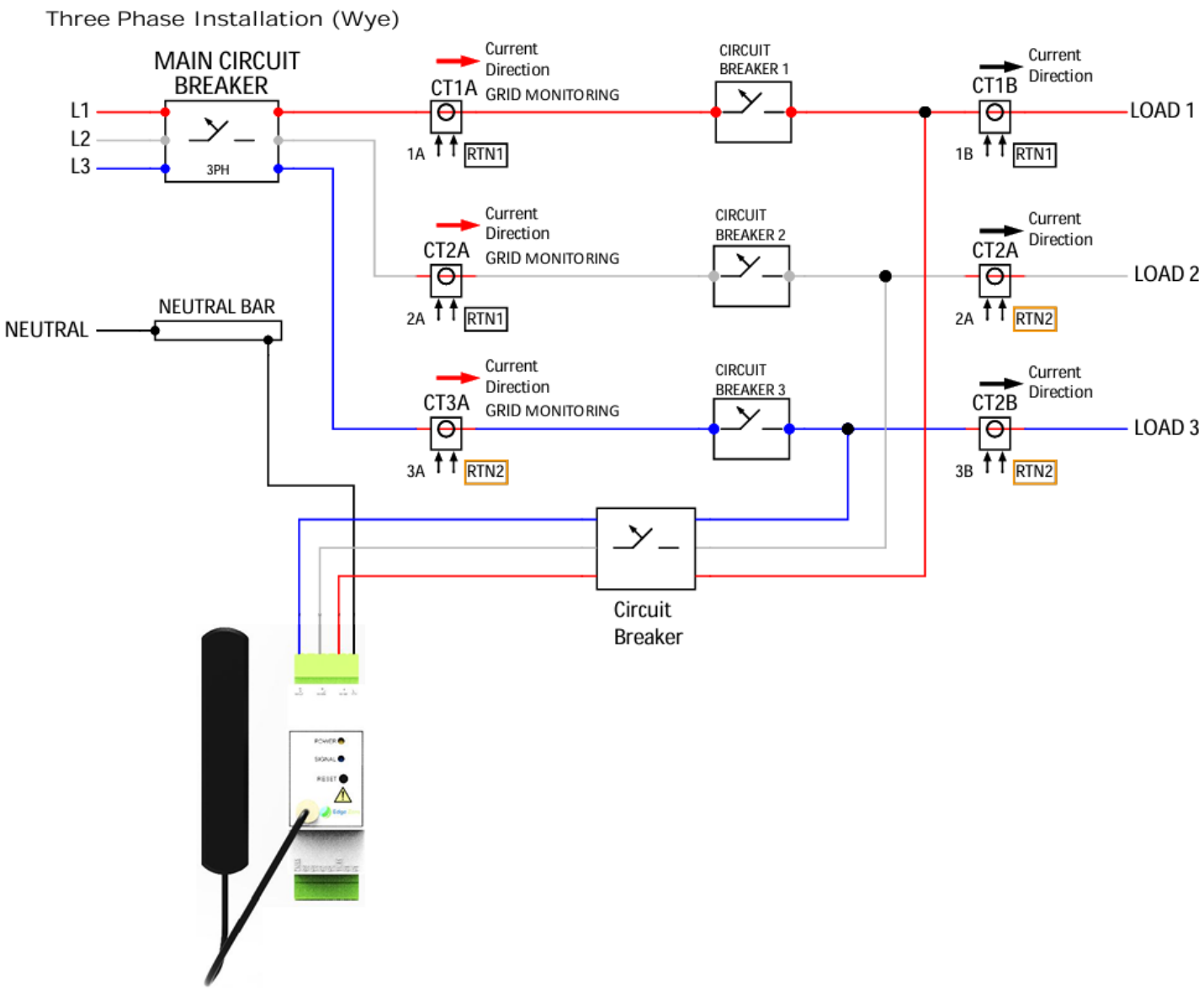
Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 11. Single Phase Connection (Non-Solar)

5.1.2. Three Phase Wye Connection (NON-SOLAR)



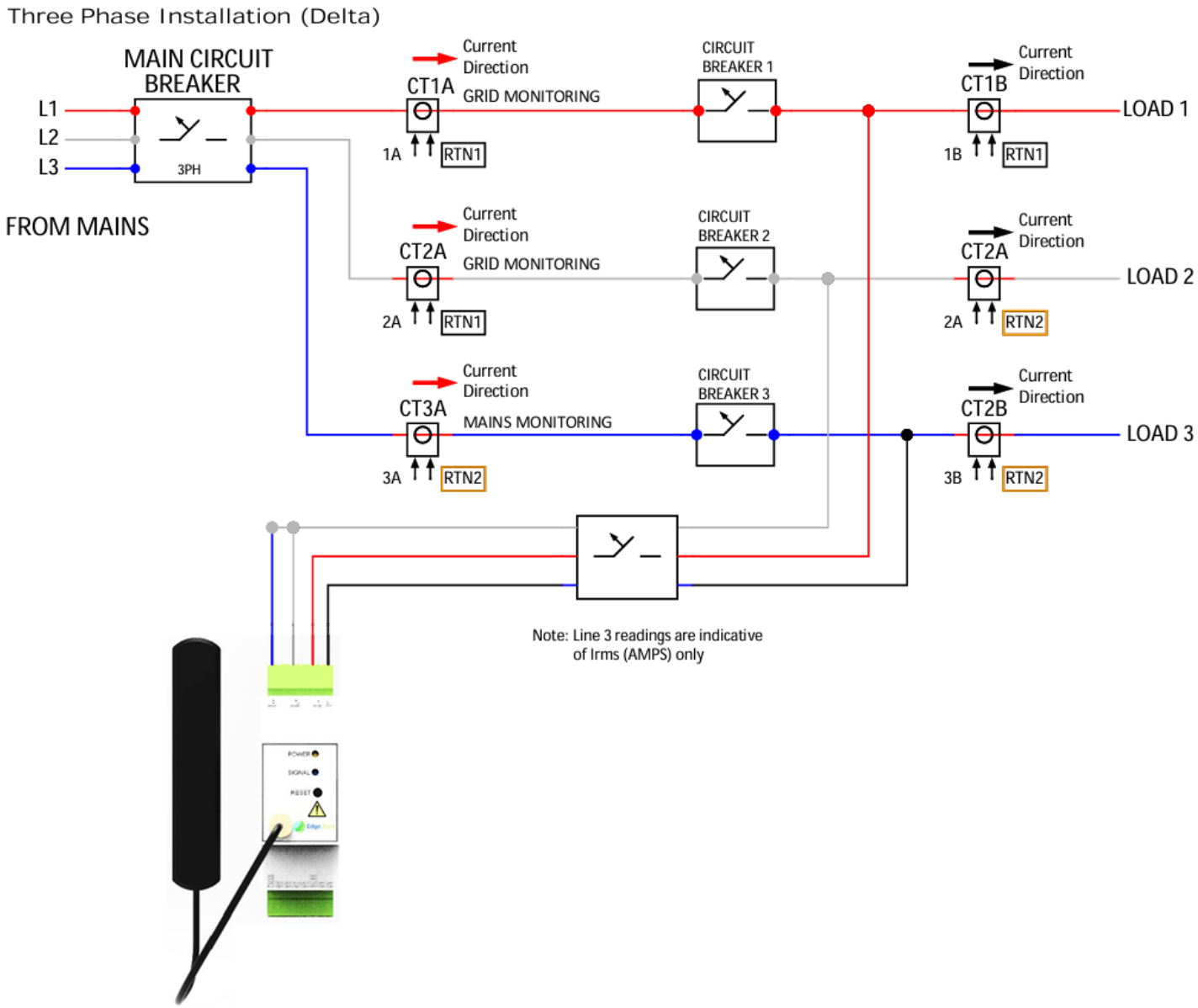
Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 12. Three Phase WYE Connection (Non-Solar)

5.1.3. Three Phase Delta Connection (NON-SOLAR)



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

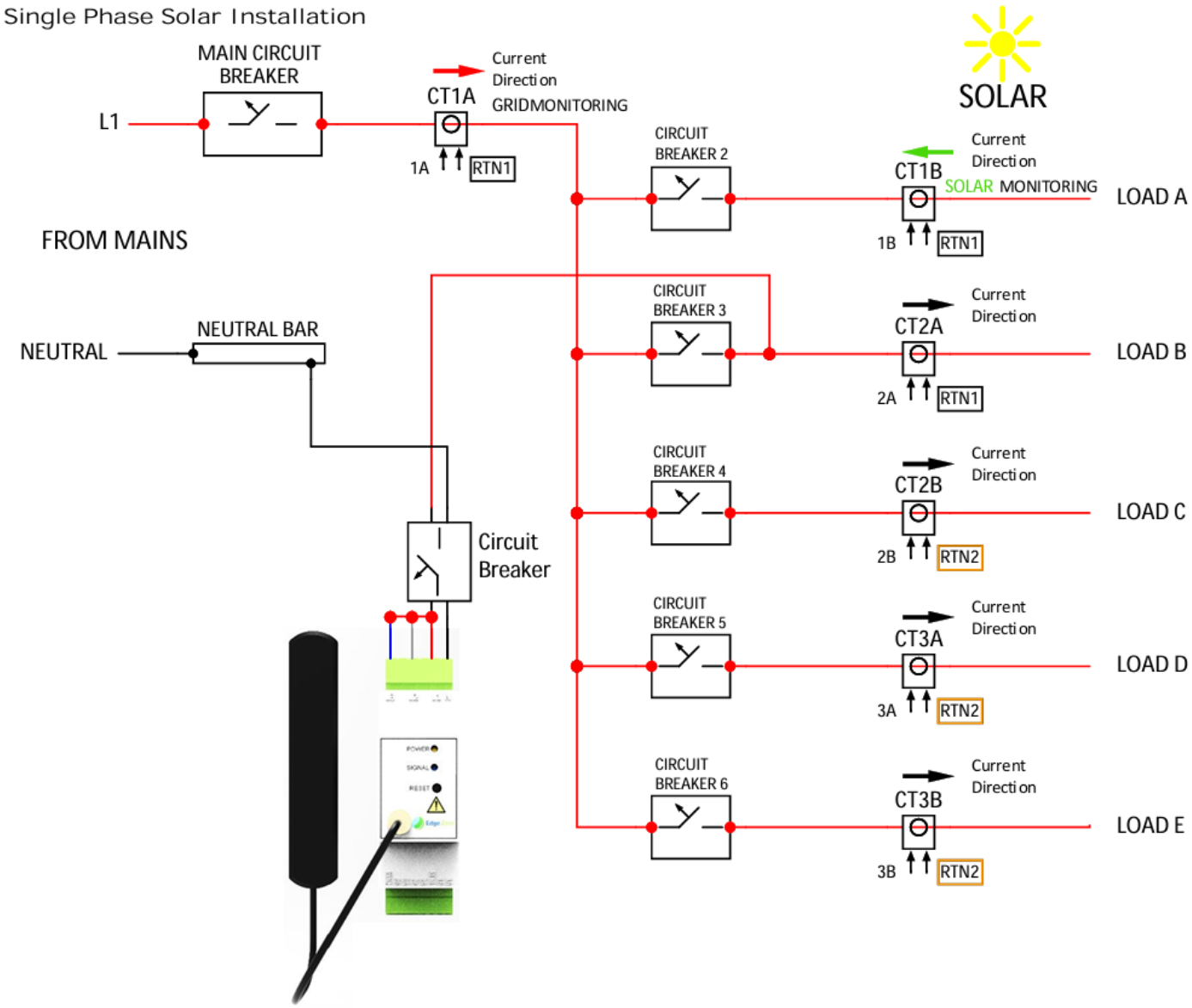
Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 13. Three Phase DELTA Connection (Non-Solar)

5.2. Solar Installation

5.2.1. Single Phase Connection (SOLAR)



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.
Note: 1. CT Rating is 333mV max.
2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

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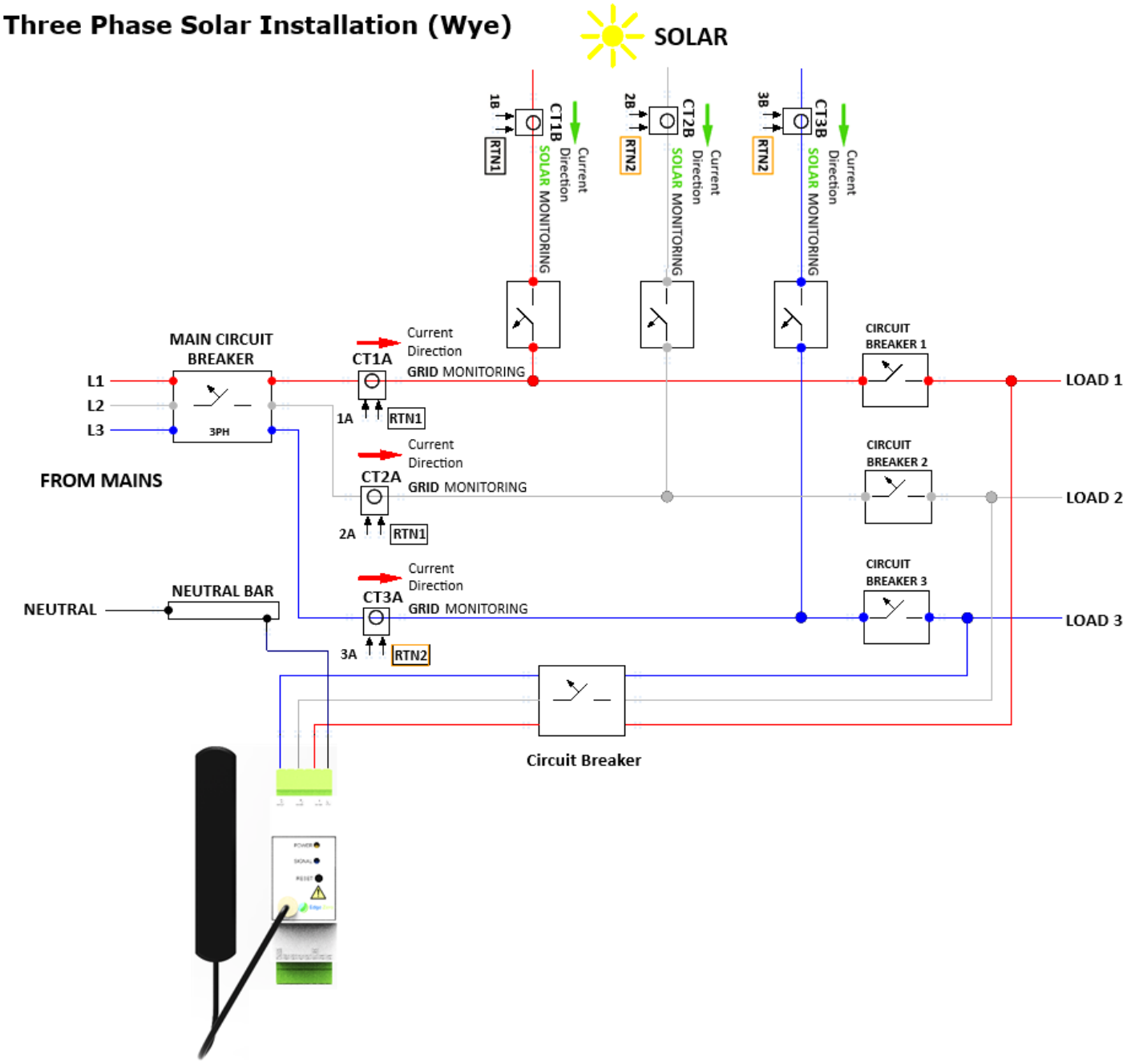
Figure 14. Single Phase Connection (Solar)

5.2.2.Three Phase Connection Wye (SOLAR)



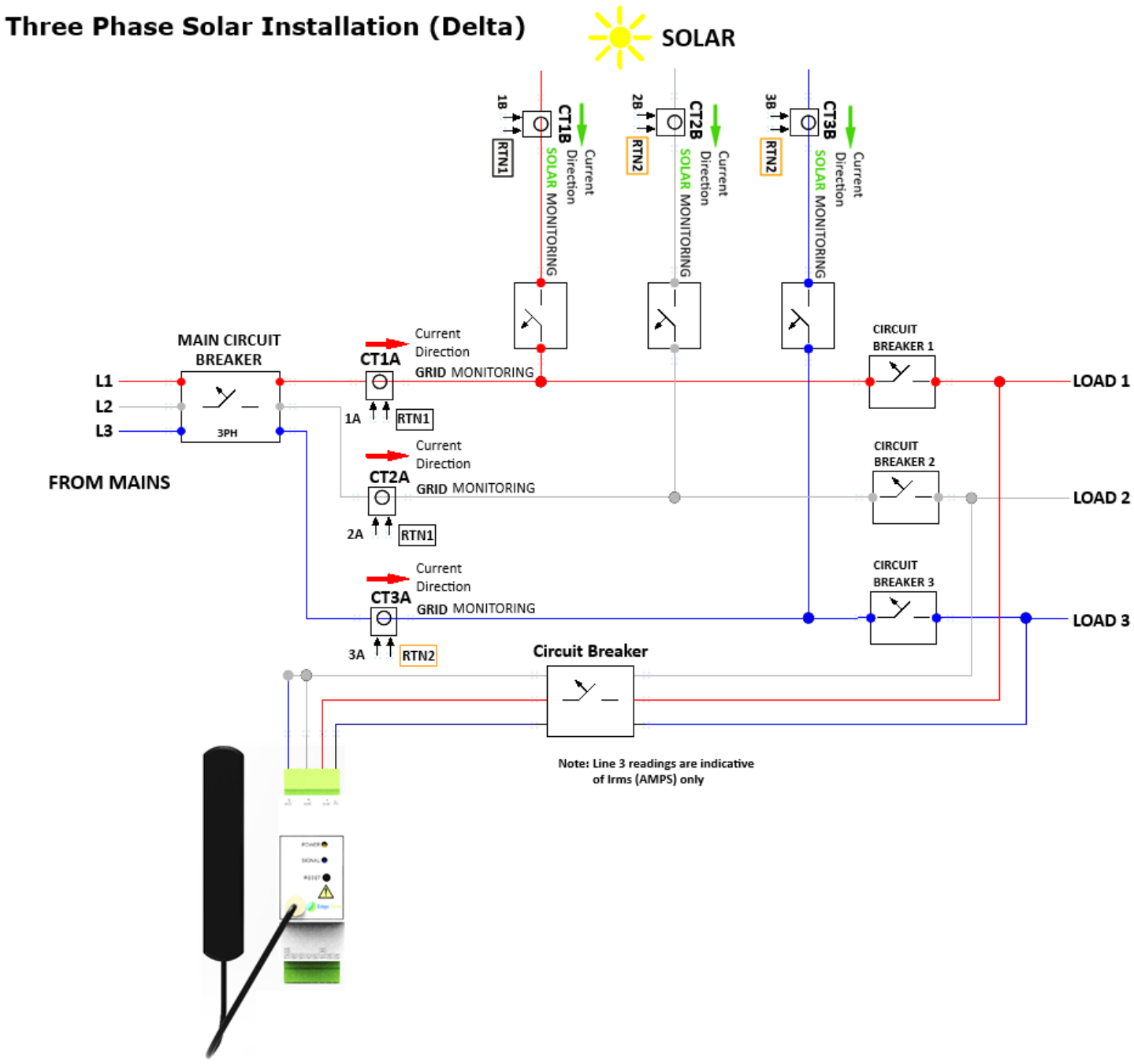
Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 15. Three Phase WYE Connection (Solar)

5.2.3. Three Phase Connection Delta (SOLAR)



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

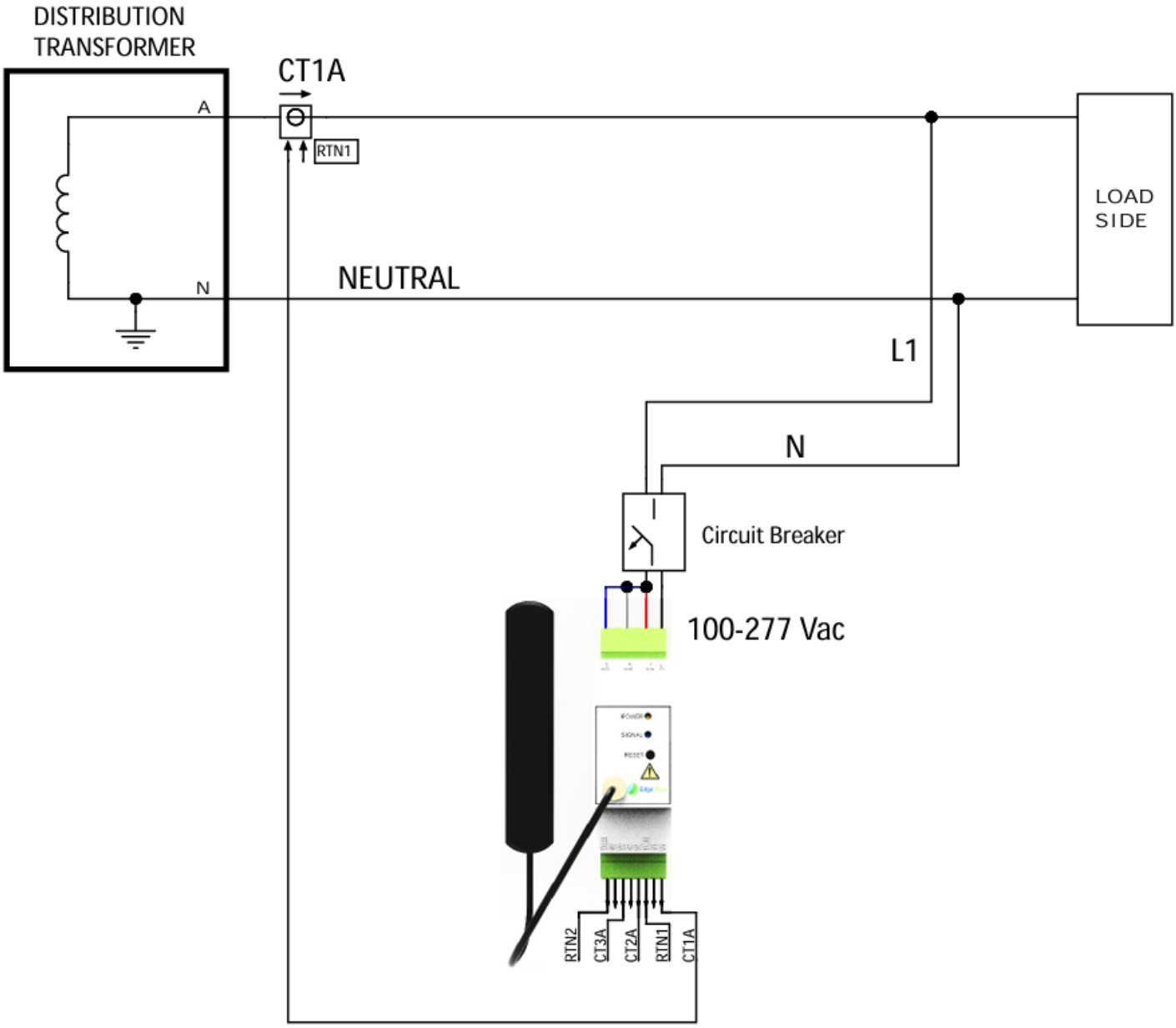
Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 16. Three Phase DELTA Connection (Solar)

5.3. Large Commercial or Industrial

5.3.1. Single Phase (2-Wire) Configuration



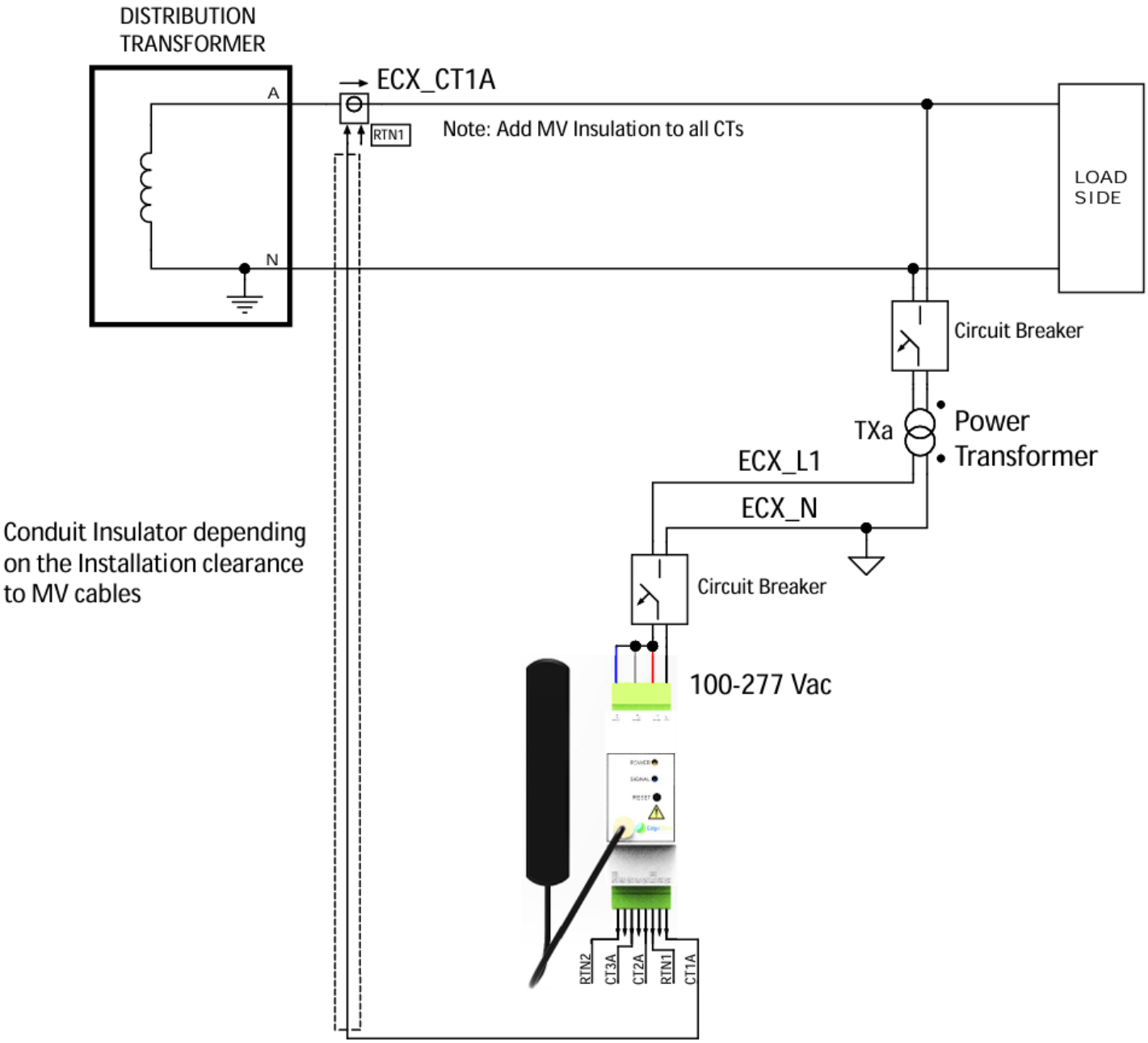
Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 17. Single Phase (2-Wire) Connection for Large Commercial/Industrial

5.3.2.Single Phase (2-wire, 1PT) – Medium Voltage Configuration



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

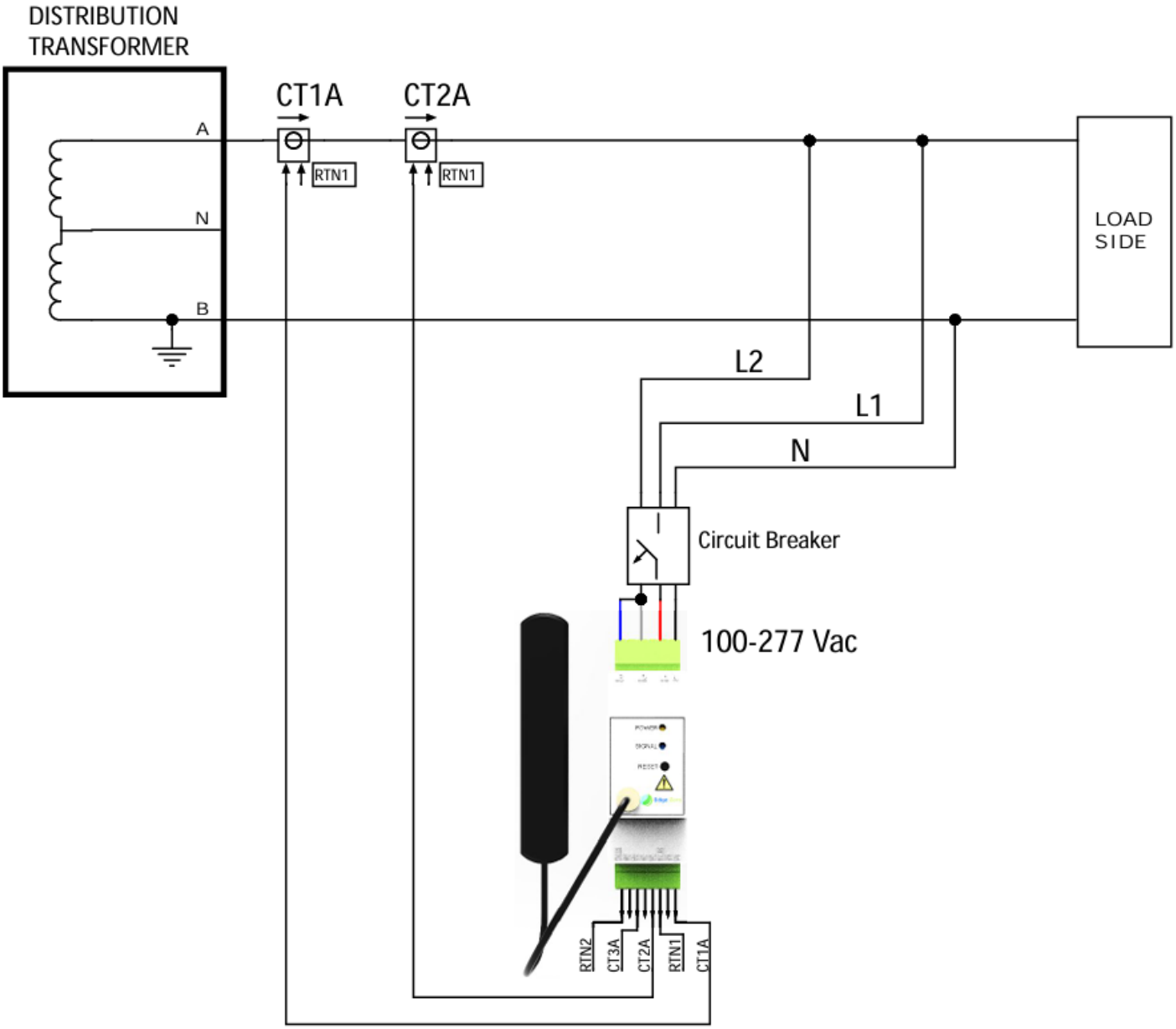
Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

3. The CT Dielectric rating is only 2KV, pls. use Rogowski for more than 2KV.

Figure 18. Single Phase (2-Wire, 1PT) Connection for Large Commercial/Industrial

5.3.3.Single Phase (3-wire) Line-to-Neutral Configuration



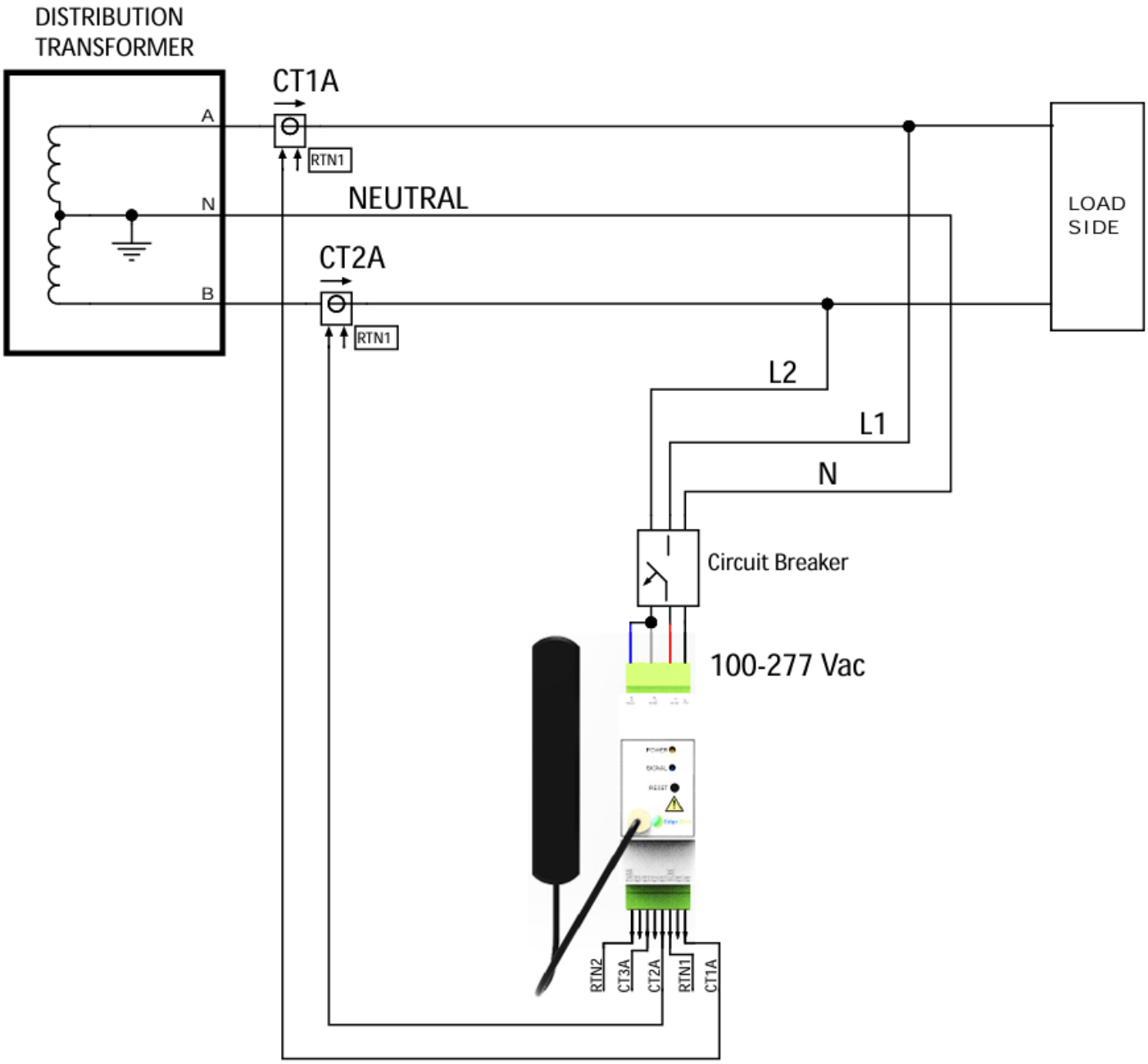
Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

Figure 19. Single Phase (3-Wire, L-E) Connection for Large Commercial/Industrial

5.3.4.Single Phase (3-Wire) Line-to-Line Configuration



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

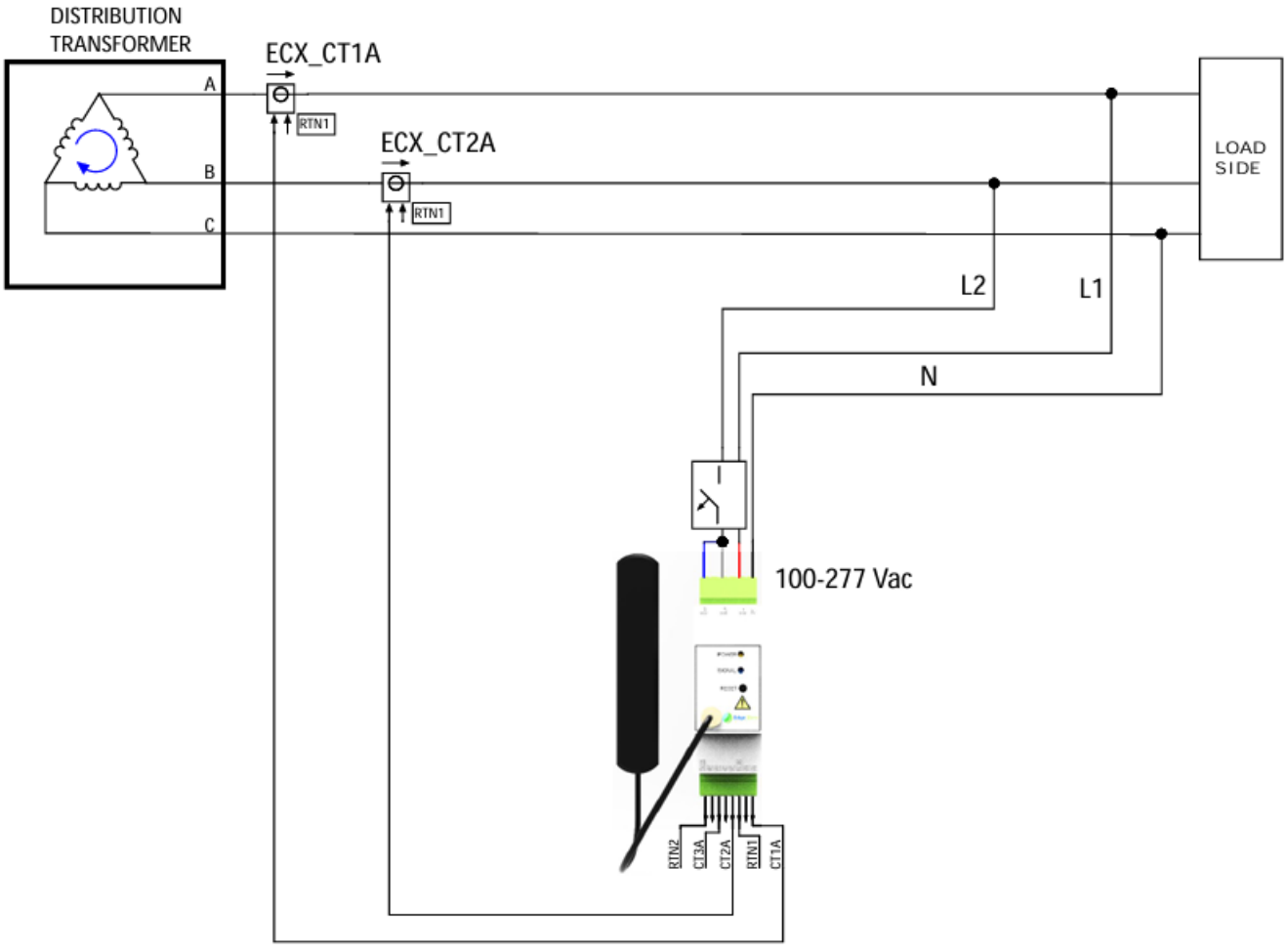
Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

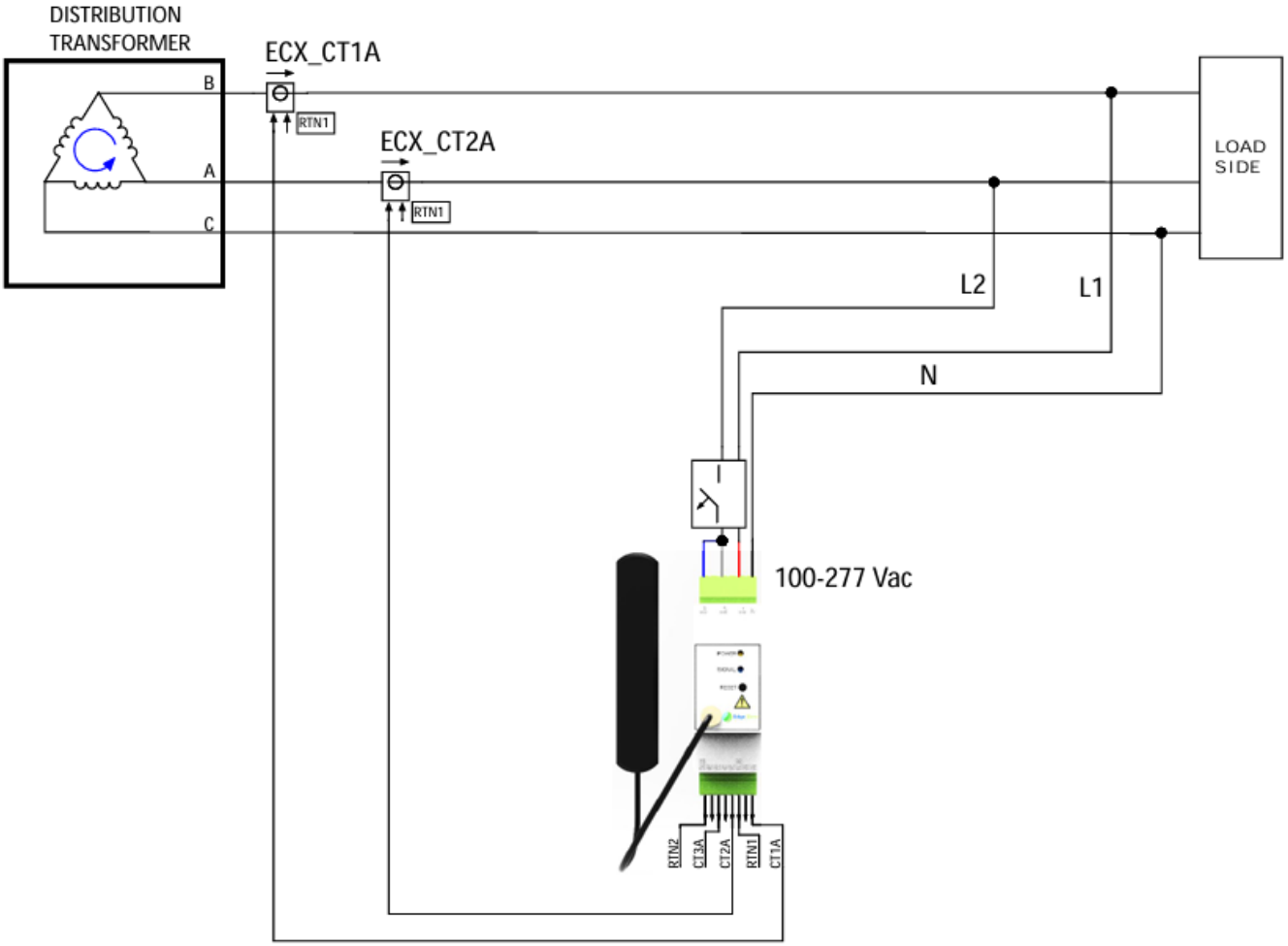
3. The CT Dielectric rating is only 2 kV; use a Rogowski coil for voltages above 2 kV.

Figure 20. Single Phase (3-Wire, L-L) Connection for Large Commercial/Industrial

5.3.5. Three Phase (3-Wire) Delta Clockwise and Delta counterclockwise Configuration CoAP command:



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.
Note: 1. CT Rating is 333mV max.
2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.
Figure 21.a. Three Phase (3-Wire, DELTA Clockwise) Connection for Large Commercial/Industrial



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement

3. The CT Dielectric rating is only 2 kV; use a Rogowski coil for voltages above 2 kV.

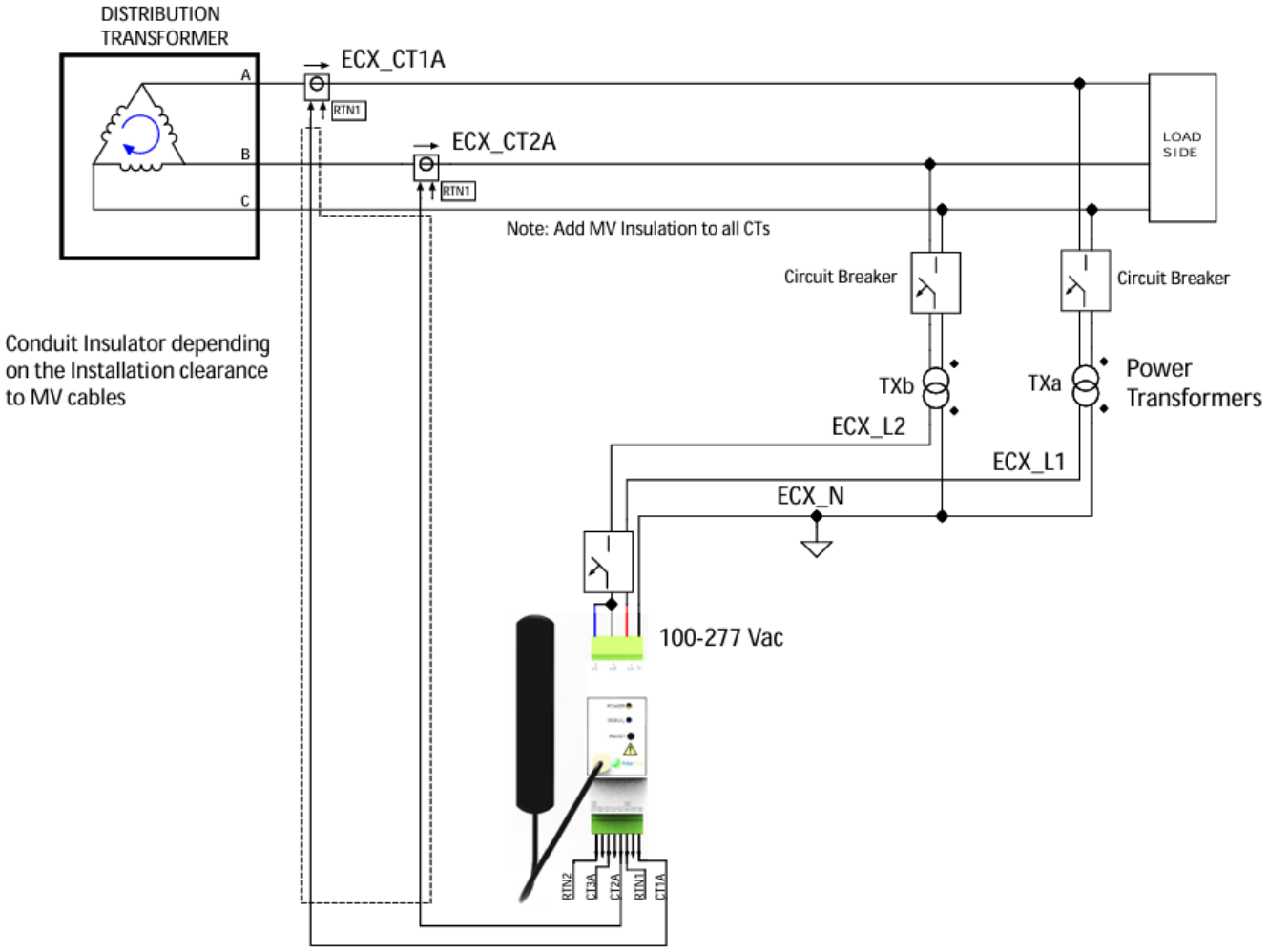
Figure 21.b. Three Phase (3-Wire, DELTA counterclockwise) Connection for Large Commercial/Industrial

Note:

1. One of the "Line" terminals of the Transformer is Earthed.

2. Input rating of Energy Monitor Line-to-Neutral is 275Vac maximum. Please use Power Transformer if Voltage Line-to-Line of Distribution Transformer exceeds Energy Monitor input rating.

5.3.6. Three Phase (3-wire, 2PT) Delta clockwise and Delta counterclockwise – Medium Voltage Configuration



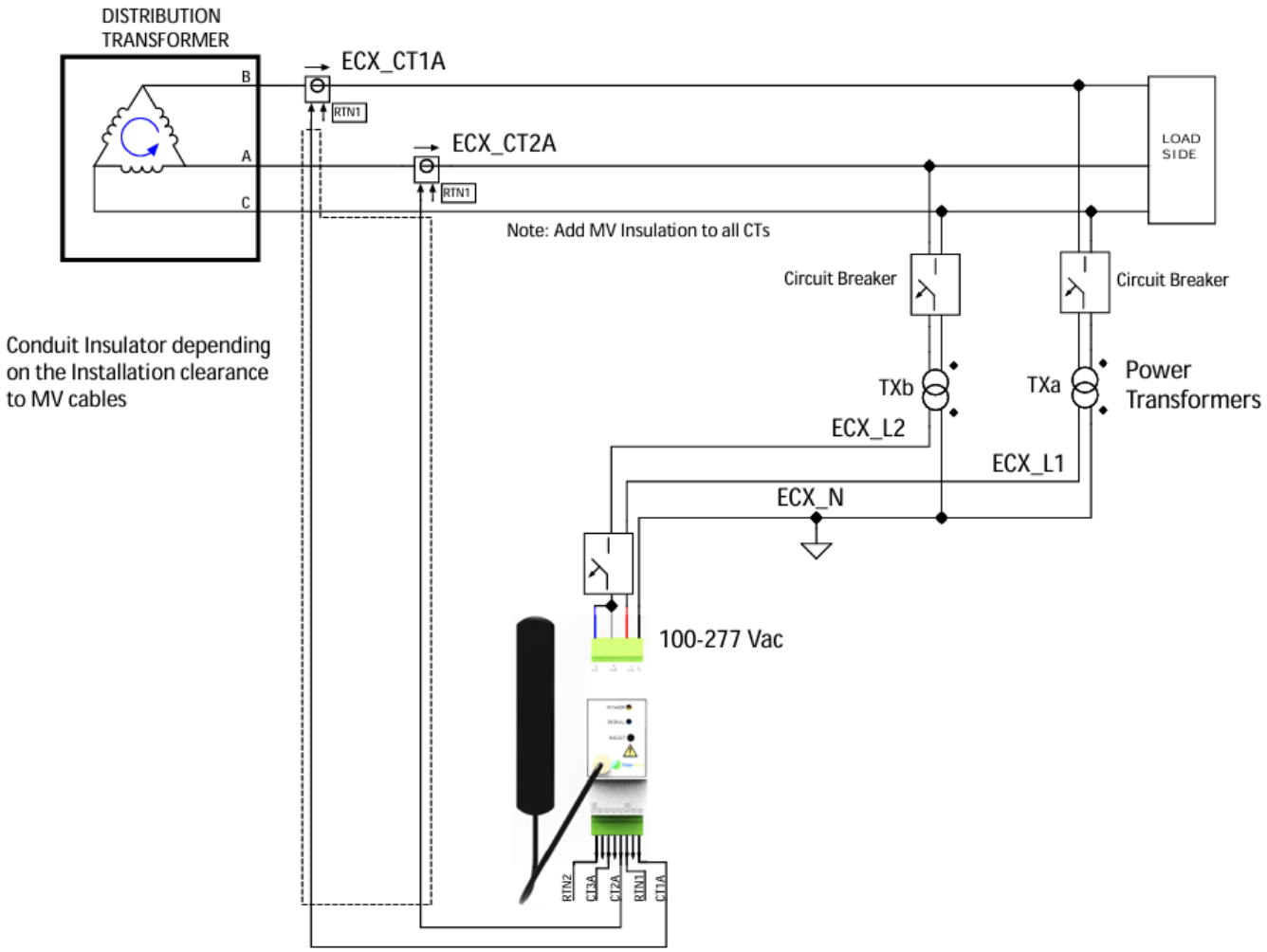
Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

3. The CT Dielectric rating is only 2 kV; use a Rogowski coil for voltages above 2 kV.

Figure 22.a. Three Phase (3-Wire, clockwise, 2PT) Connection for Large Commercial/Industrial



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

3. The CT Dielectric rating is only 2 kV; use a Rogowski coil for voltages above 2 kV.

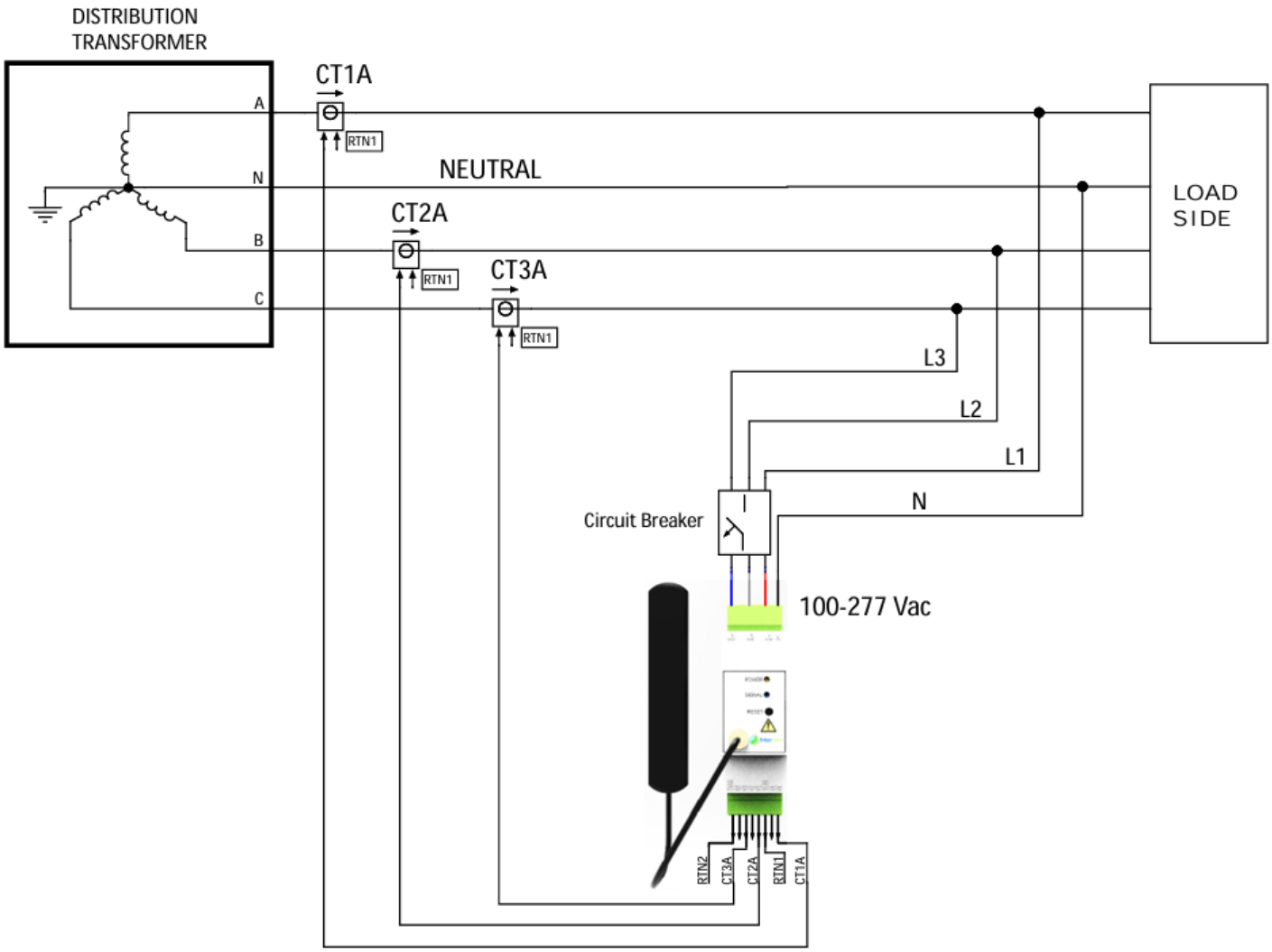
Figure 22.b. Three Phase (3-Wire, counterclockwise, 2PT) Connection for Large Commercial/Industrial

Note:

1. Note: One of the "Line" terminals of the Transformer is Earthed.

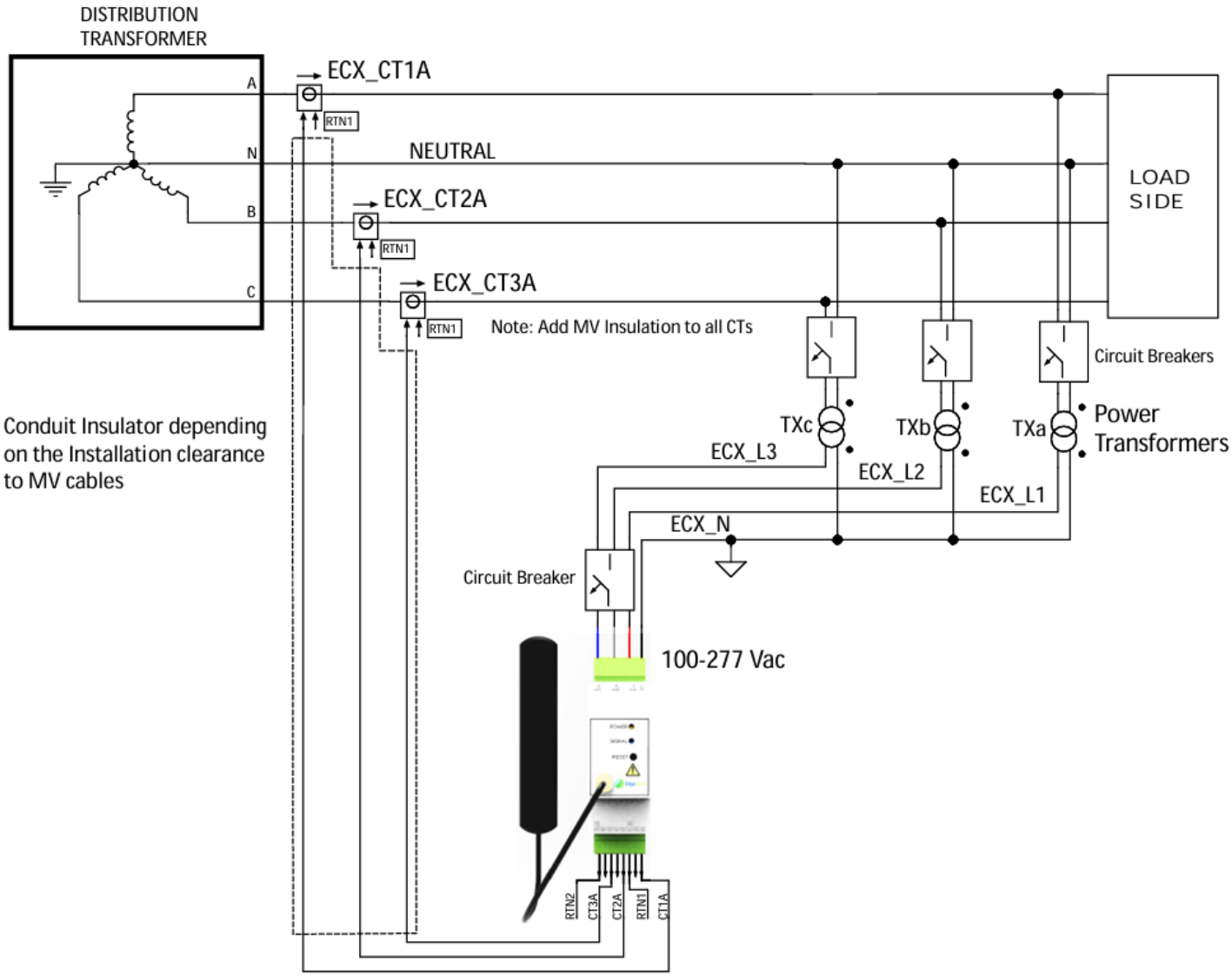
2. Use Rogowski Coil for Medium Voltage and refer to Section 4.8 Medium Voltage Current Transformer Isolator Bushing Installation

5.3.7. Three Phase (4-wire) Wye Line-to-Neutral



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.
Note: 1. CT Rating is 333mV max.
2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.
Figure 23. Three Phase (3-Wire, WYE, L-N) Connection for Large Commercial/Industrial

5.3.8. Three Phase (4-wire, 3PT) Wye Line-to-Neutral – Medium Voltage Configuration



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

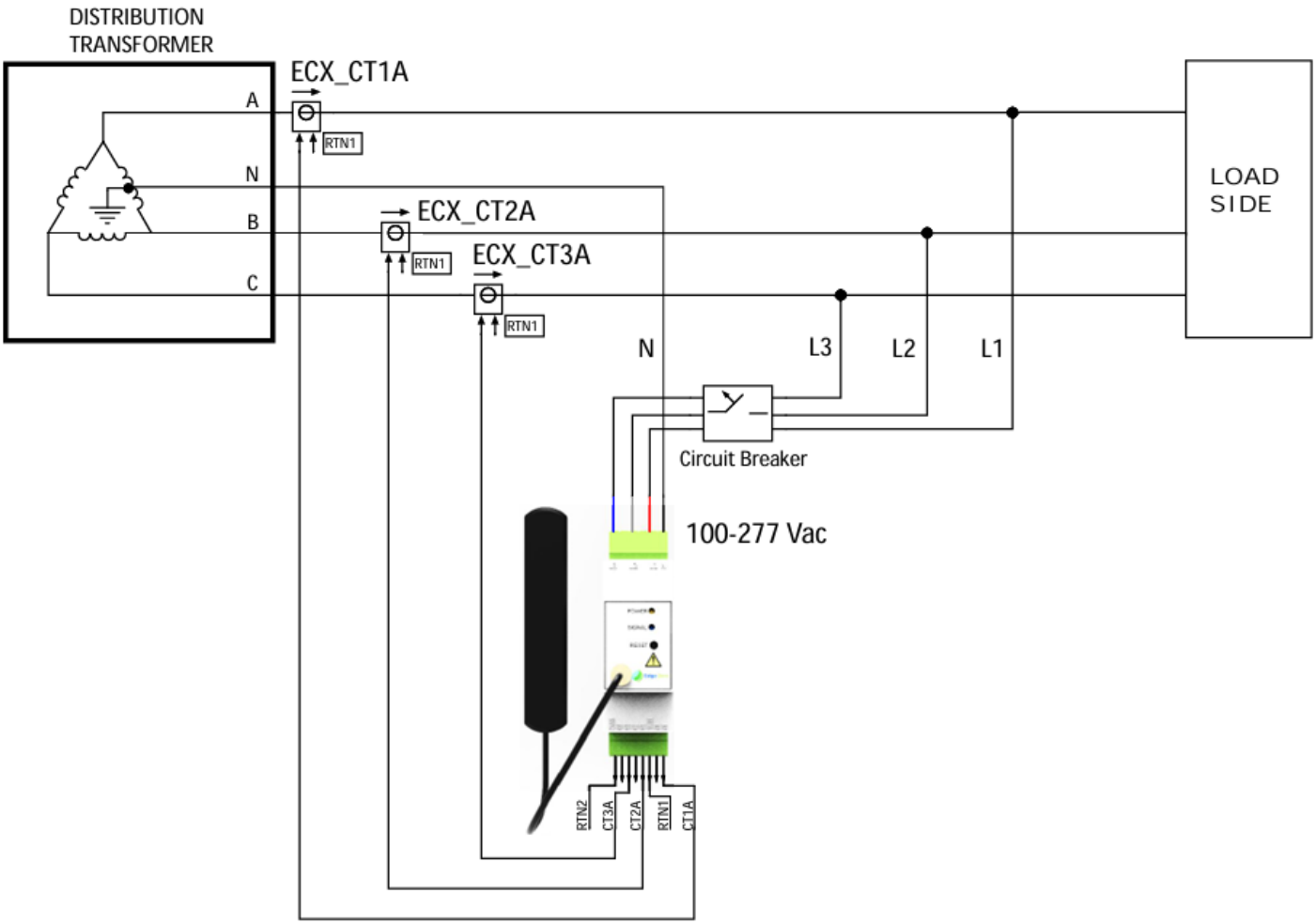
Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

3. The CT Dielectric rating is only 2 kV; use a Rogowski coil for voltages above 2 kV.

Figure 24. Three Phase (3-Wire, WYE, L-N, 3PT) Connection for Large Commercial/Industrial

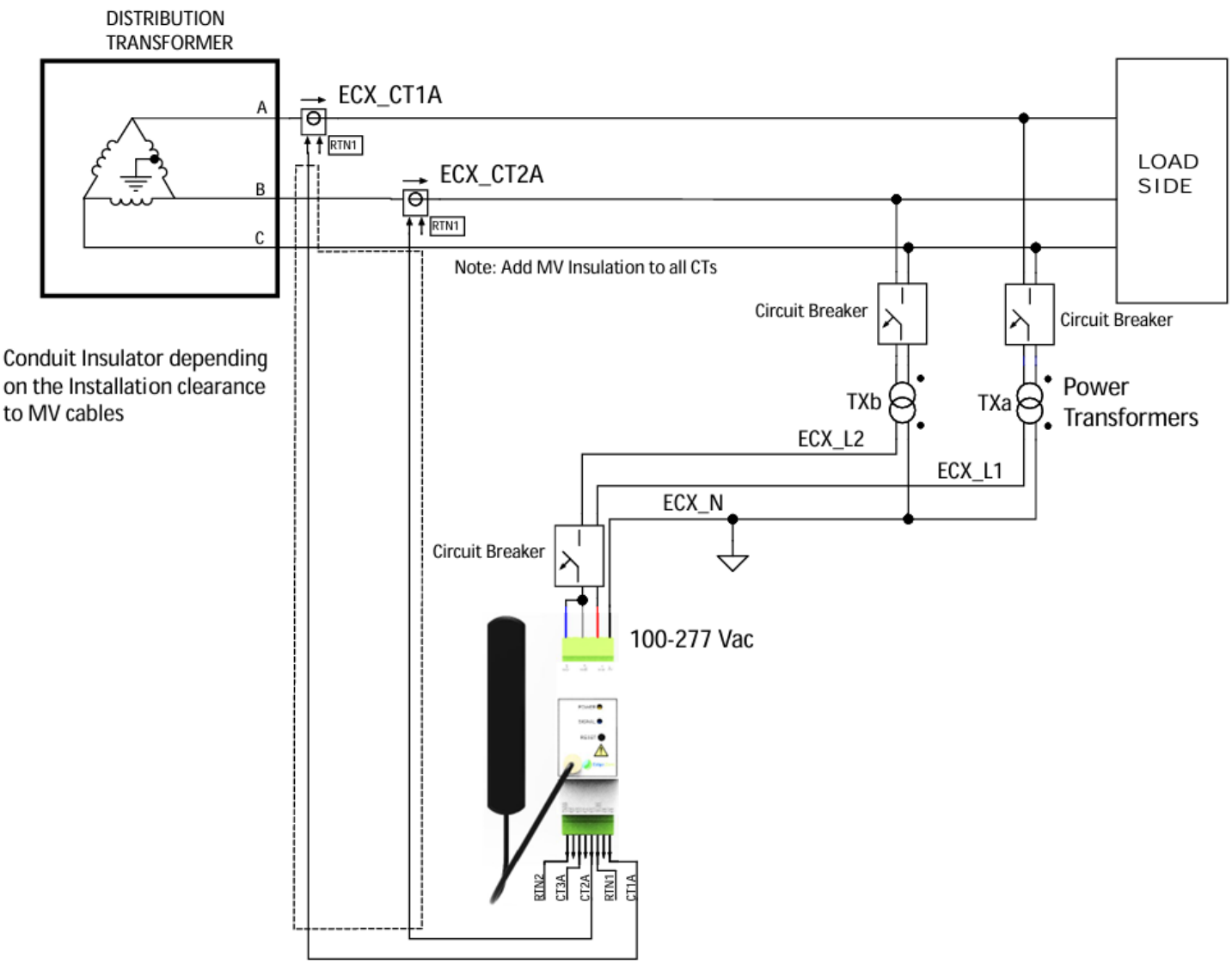
5.3.9. Three Phase (3-Wire) Delta with Mid Tap Connection on A-B Configuration



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.
Note: 1. CT Rating is 333mV max.
2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.
Figure 25. Three Phase (3-Wire, DELTA Mid Tap Connection on A-B) Connection for Large Commercial/Industrial

Note:
1. Input rating of Energy Monitor Line-to-Neutral is 275Vac maximum. Please use Power Transformer if Voltage Line-to-Line of Distribution Transformer exceeds Energy Monitor input rating.

5.3.10. Three Phase (3-Wire, 2PT) Delta with Mid Tap Connection on A-B – Medium Voltage Configuration



Important: CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.

Note: 1. CT Rating is 333mV max.

2. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.

3. The CT Dielectric rating is only 2 kV; use a Rogowski coil for voltages above 2 kV.

Figure 26. Three Phase (3-Wire, DELTA Mid Tap Connection on A-B, 2PT) Connection for Large Commercial/Industrial

Note:

1. Input rating of Energy Monitor Line-to-Neutral is 275Vac maximum. Please use Power Transformer if Voltage Line-to-Line of Distribution Transformer exceeds Energy Monitor input rating.

6. Wiring the Voltage Input Connector

6.1. Prepare AWG 18 Black and Red cut into required length and cut a strip length of 6-7mm.
6.2. Connect the wires into the corresponding slot of the supplied input connector as shown. Apply a tightening torque 0.35Nm-0.4Nm to screw. Refer to Section 4.2 for the Wiring Diagram.

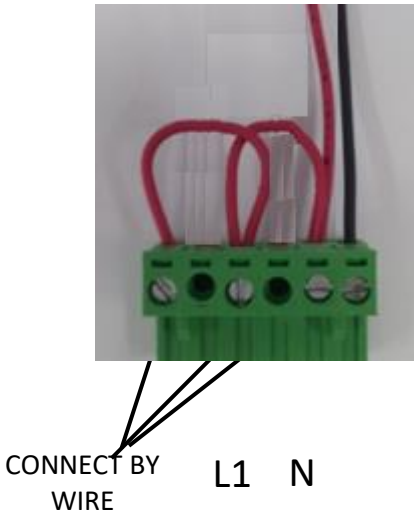


Figure 27. Sample Wiring Diagram for Single Phase Installation

7. Wiring the CT Connector

7.1. Before inserting the CTs on the connector, measure the resistance across the secondary cables of the CT. Measured resistance should be less than or equal to 15 Ω ($R < 15\ \Omega$).

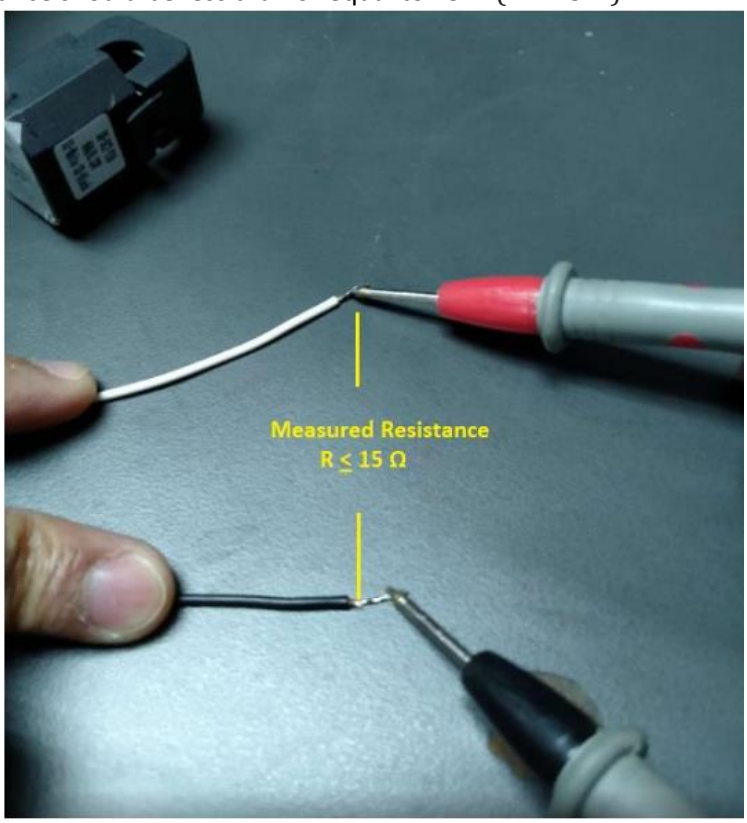
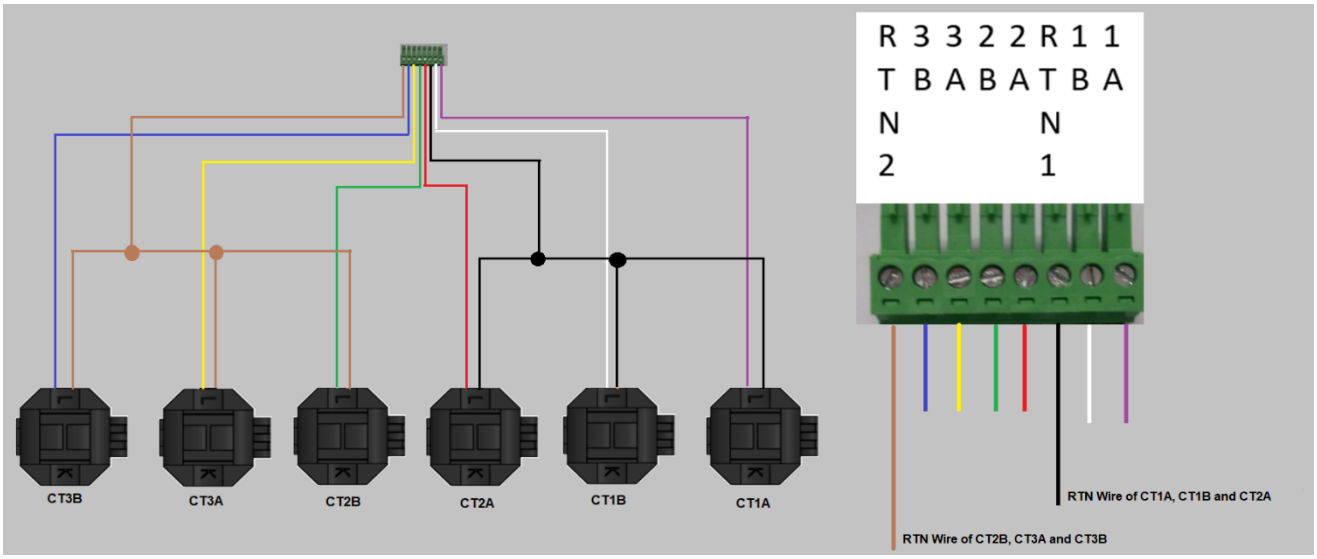


Figure 28. Measure Resistance Across Secondary Cable of CT

7.2. Connect the wire of CT into the corresponding slot of the supplied CT connector as shown. Apply a tightening torque 0.18Nm-0.2Nm to screw.



Important: CT Rating is 333mV max. CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.
Figure 29. CT Connection Per Phase

Note:

1. If other CT's will be used, other than the Edge CT's, kindly take note of the following:
Use Current Transformer with internal Burden Resistor and with secondary output at max 333mV.
The accuracy of the Energy Monitor is only guaranteed with the CT included in the package.
Current Transformer with Current (mA/Amps) as output is NOT compatible and may damage the Energy Monitor.
2. *CT_RTN should NOT be connected to L1, L2, L3, Neutral or EARTH.*
3. Unused or open CT Terminal must be connected to CT_RTN to avoid noise on measurement.
Using the equation: $V_n = \sqrt{4kTRB}$, tells you that **noise increases with resistance**. So:
Short → R ≈ 0 → almost no thermal noise
Open → R → ∞ → huge thermal + environmental noise
This is why recommended the unused CT's either shorting or terminating the input, not leaving it open.
Where: Vn = the RMS noise voltage in Volts.
k = Boltzmann's constant, approximately 1.38×10^{-23} J/K
T = The absolute temperature in Kelvin (K)
R = The resistance in Ohms (Ω)
B = The bandwidth in Hertz (Hz

8. Insertion of Voltage Input Connector and CT Connector

Insert the Input Connector and CT Connector as shown.

Figure 30. CT Connection Per Phase

9. Installing the CT

9.1. Refer to the wiring diagram for connection. (Section 4.2)
9.2. Before installing the CT, ensure to power off the circuit to prevent electric shock.
9.3. Clip CT around the cable to be measured. Make sure the maximum current of cable does not exceed CT's rating value as indicated on the label of CT and the current direction is same as the arrow direction marked on the CT.
9.4. The cable should be in the middle of the CT window.
9.5. Fix the CT on the cable with cable ties.

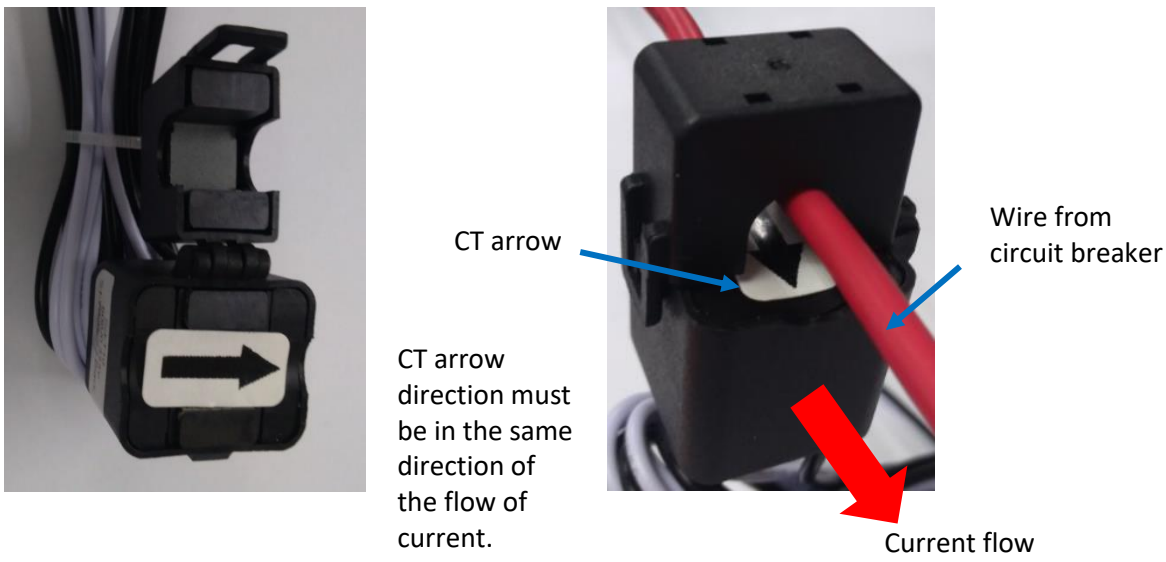


Figure 31. Correct CT Installation

10. Uninstalling the Energy Monitor

10.1. Get a small screwdriver and insert the tip on the hole of the slide lock, carefully push the slide lock upward to release the lock, then pull out Energy Monitor from DIN rail.

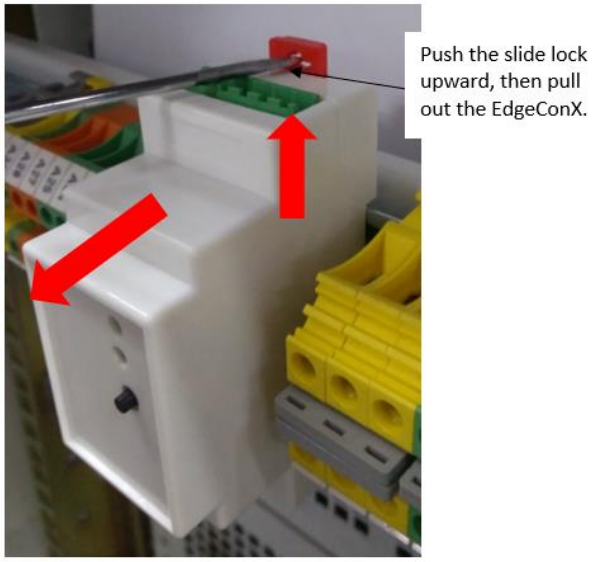


Figure 32. Uninstallation of the Energy Monitor

11. Wi-Fi Setup Instruction

11.1. **WPS Switch Mode**

This mode enables the device to connect to the router without entering any credentials. To enable this mode, *press and hold the AP button for 5 seconds.* The AMBER LED will blink slowly every (1) second. Then press the WPS button of the router.

11.2. **Access Point Switch Mode**

This mode enables the device Wi-Fi credential registration through its Access Point Mode. Hold the AP button for *5 more seconds after WPS mode* is set. The AMBER LED will blink four (4) times every second. Two available options are shown below:

Scan Wi-Fi QR Code (For Android and IOS devices)

Figure 33. Sample Box Wi-Fi QR Code location

For Android Users: Go to settings > Connections > Wi-Fi > Tap the QR scanner icon on the top right of the screen > Scan the Wi-Fi QR code.

For IOS Users: Open the Camera > Scan the Wi-Fi QR code > Tap the "join EM- *xxxxxxxxxxx* network" > Tap "*Join*".

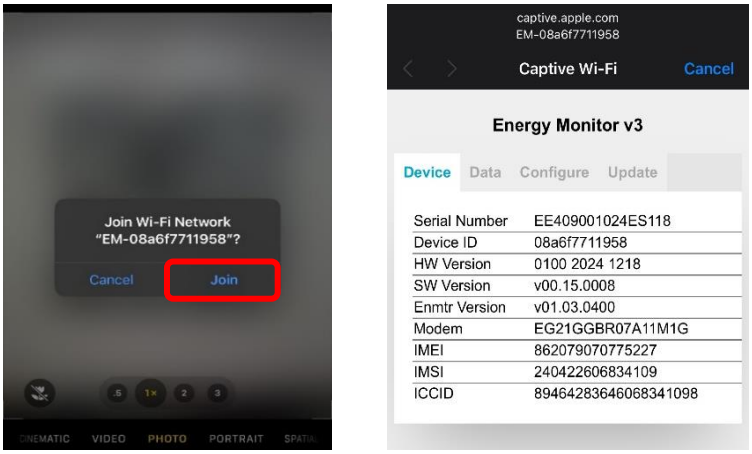


Figure 34. Sample IOS QR Scanning

This will automatically open the UI of the device for both Android and IOS users (will skip step 3 and open UI).

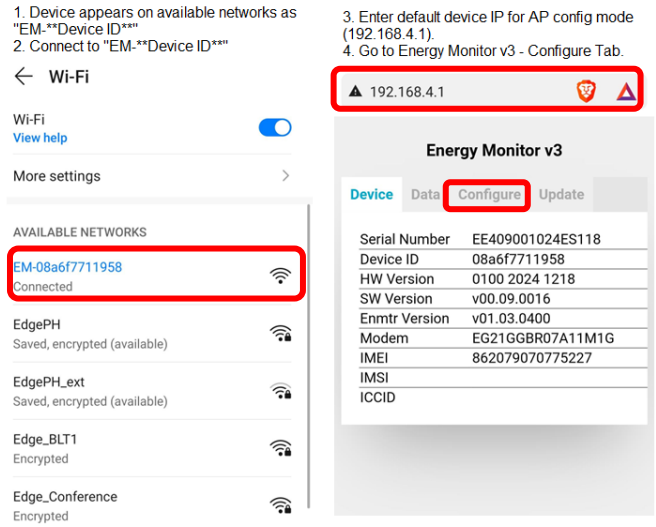
For QR App: Scan the Wi-Fi QR code > Tap the "Connect" button to directly connect to the device network (proceed to step 3).

11.3. **Manual Connect**

Open phone Wi-Fi settings and connect to '*EM-xxxxxxxxxxx'.* (proceed to step 3)

Setting Up Wi-Fi

a. Open a web browser (preferably on Google Chrome) and enter ***192.168.4.1*** on the search address.
b. Under configure tab, set the Wi-Fi SSID and Password then tap Set.
c. Reboot the device using the "***Reboot Device***" button below to reset or restart the hardware.



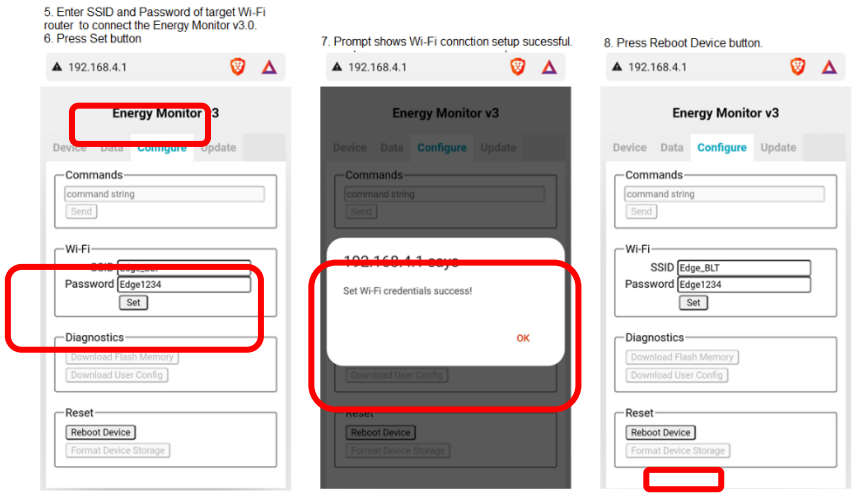


Figure 35. Manual Connection Guide

12. Housekeeping

12.1. LED status indicators

The Unit shall have two status LEDs, one for Power (Green) and another for Communication (Blue and Amber).

Device Status (Wi-Fi/4G Cat-1/LTE Cat-M1)						Power LED	Wi-Fi LED	Cellular LED
Power to Hardware	**Hardware Error**	**Cellular Hardware Communication**	**Wi-Fi Network Connection**	**Cellular Network Connection**	**Cloud Server Connection**	**(Green)**	**(Amber)**	**(Blue)**
OFF	X	x	x	x	x	OFF	OFF	OFF
ON	CRITICAL ERROR	x	x	x	x	OFF	OFF	OFF
ON	NONE	NO	x	x	x	ON (Solid)	SLOW BLINK (1Hz) alternate Amber and Blue	
ON	NONE	YES	WPS Configuration	x	x	ON (Solid)	SLOW BLINK (1Hz)	OFF
ON	NONE	YES	AP Configuration	x	x	ON (Solid)	FAST BLINK (4Hz)	OFF
ON	NONE	YES	DISCONNECTED	DISCONNECTED	x	ON (Solid)	OFF	OFF
ON	NONE	YES	DISCONNECTED	CONNECTED	DISCONNECTED	ON (Solid)	OFF	PULSE (every 5 Sec)
ON	NONE	YES	DISCONNECTED	CONNECTED	CONNECTED	ON (Solid)	OFF	ON (Solid) SLOW BLINK (1Hz) if RSSI < -85dBm
ON	NONE	YES	CONNECTED	x	DISCONNECTED	ON (Solid)	PULSE (every 5 Sec)	OFF
ON	NONE	YES	**CONNECTED***	x	CONNECTED	ON (Solid)	ON (Solid)	OFF

Figure 36. LED Status Indicators

Note: * Wi-Fi connection has higher priority in data transmission.

13. *Commissioning - please use Edge Zero installer application to commission the unit.*